

CLAIMS

1. A method for producing microdroplets, comprising the step of allowing a first dispersion phase and a second dispersion phase to act on a first continuous phase at an intersection portion among the first continuous phase, the first dispersion phase, and the second dispersion phase, whereby the microdroplets are sequentially produced.

2. The method for producing microdroplets, according to Claim 1, wherein the intersection portion is a cross intersection portion.

3. The method for producing microdroplets, according to Claim 1, wherein the intersection portion includes T-shaped intersection portions, the T-shaped intersection portions being located at positions shifted from each other.

4. The method for producing microdroplets, according to Claim 1, wherein microdroplets formed of the first dispersion phase are different from microdroplets formed of the second dispersion phase.

5. The method for producing microdroplets, according to Claim 2, wherein the first dispersion phase and the second dispersion phase are allowed to alternately act on at

predetermined time intervals so that microdroplets having uniform sizes and different components are alternately produced at a regular period.

6. The method for producing microdroplets, according to Claim 3, wherein the first dispersion phase and the second dispersion phase are allowed to alternately act on at predetermined time intervals so that microdroplets having uniform sizes and different components are alternately produced at a regular period.

7. The method for producing microdroplets, according to Claim 5 or 6, wherein the period is changeable.

8. A method for producing microdroplets, comprising the steps of: allowing a first dispersion phase and a second dispersion phase to act on a first continuous phase at a cross intersection portion among the first continuous phase, the first dispersion phase, and the second dispersion phase so as to sequentially produce different microdroplets; and supplying a liquid containing the different microdroplets to another cross intersection portion to which the first continuous phase and a second continuous phase are supplied, whereby double emulsion-microcapsules are produced.

9. An apparatus for producing microdroplets, comprising:

(a) an intersection portion at which a first continuous phase, a first dispersion phase, and a second dispersion phase intersect with each other;

(b) a first liquid feed device controlling the first dispersion phase;

(c) a second liquid feed device controlling the second dispersion phase; and

(d) a control device connected to the first liquid feed device and the second liquid feed device,

wherein (e) the first liquid feed device and the second liquid feed device are controlled by a signal from the control device so that microdroplets formed of the first dispersion phase and microdroplets formed of the second dispersion phase are sequentially produced.

10. The apparatus for producing microdroplets, according to Claim 9, wherein the intersection portion is a cross intersection portion.

11. The apparatus for producing microdroplets, according to Claim 9, wherein the intersection portion includes T-shaped intersection portions, the T-shaped intersection portions being located at positions shifted from each other.

12. The apparatus for producing microdroplets, according to Claim 10, wherein by the signal from the control device, microdroplets having uniform sizes and different components are alternately produced at a regular period.

13. The apparatus for producing microdroplets, according to Claim 11, wherein by the signal from the control device, microdroplets having uniform sizes and different components are alternately produced at a regular period.

14. The apparatus for producing microdroplets, according to Claim 12 or 13, wherein by the signal from the control device, the period is changeable.

15. The method for producing microdroplets, according to Claim 8, wherein a liquid containing the microdroplets is supplied to another cross intersection portion to which the first continuous phase and the second continuous phase are supplied so as to produce double emulsion-microcapsules.

16. A method for producing microdroplets, comprising the steps of: separating a liquid containing primary droplets and satellite droplets into the primary droplets and the satellite droplets at an expansion portion; and recovering the primary droplets and the satellite droplets in a primary

droplet recovery channel and a satellite droplet recovery channel, respectively, at a branching portion.

17. The method for producing microdroplets, according to Claim 16, wherein the primary droplets comprise first and second primary droplets and the satellite droplets comprise first and second satellite droplets, and at the branching portion, the first and the second primary droplets, the first satellite droplets, and the second satellite droplets are separately recovered.

18. The method for producing microdroplets, according to Claim 16, wherein a liquid containing the satellite droplets is supplied to an intersection portion to which a first continuous phase and a second continuous phase are supplied, whereby double emulsion-microcapsules are produced.

19. An apparatus for producing microdroplets, comprising:

- (a) a microdroplet producing portion producing primary droplets and satellite droplets;
- (b) a microdroplet supply channel supplying microdroplets from the microdroplet producing portion;
- (c) an expansion portion connected to the microdroplet supply channel; and
- (d) a branching portion having a satellite droplet

recovery channel to recover the satellite droplets and a primary droplet recovery channel connected to a front end of the expansion portion to recover the primary droplets.

20. An apparatus for producing microdroplets, comprising:

(a) a microdroplet producing portion producing first and second primary droplets and first and second satellite droplets;

(b) a microdroplet supply channel supplying microdroplets from the microdroplet producing portion;

(c) an expansion portion connected to the microdroplet supply channel; and

(d) a branching portion having a primary droplet recovery channel connected to a front end of the expansion portion to recover the first and the second primary droplets, a first satellite droplet recovery channel to recover the first satellite droplets, and a second satellite droplet recovery channel to recover the second satellite droplets.